What is claimed is:

1. A method for robustly producing a motion compensated interpolation video frame, the method comprising:

constructing N motion compensated interpolated frames between two existing frames F1 and F2, wherein N comprises an integer with a value of at least 2; and

fusing the N motion compensated interpolated frames into a single motion compensated interpolated frame.

2. The method of claim 1 wherein constructing each of the N motion compensated interpolated frames between the two existing frames F1 and F2 further comprises:

selecting a first set of pixels in F1, wherein the pixel sets selected for each of the N motion compensated frames varies;

selecting a corresponding second set of pixels in F2, wherein the corresponding pixel sets selected for each of the N motion compensated frames varies;

generating a first mesh for the first set of pixels and a second mesh for the second set of pixels;

estimating a first flow of motion from the first set of pixels to the second set of pixels, and a second flow of motion from the second set of pixels to the first set of pixels;

generating a first motion compensated mesh based on the first mesh and the first estimated flow of motion, and a second motion compensated mesh based on the second mesh and the second estimated flow of motion;

computing a first warped image by warping F1 using the first mesh and the first motion compensated mesh, and a second warped image by warping F2 using the second mesh and the second motion compensated mesh; and

linearly combing the first warped image and the second warped image.

3. The method of claim 2 wherein selecting a set of pixels in a frame further comprises:

classifying some pixels in the frame as having high spatial frequency contents and selecting the classified pixels, wherein the specific classification criteria is different for each of the N motion compensated frames.

4. The method of claim 2 wherein generating a mesh for a set of pixels further comprises:

fitting a polygonal mesh to the set of pixels.

5. The method of claim 4 wherein fitting a polygonal mesh to a set of pixels further comprises:

applying a Delaunay triangulation to the set of pixels, using edges of the associated frame as imposed boundaries.

6. The method of claim 2 wherein estimating a flow of motion between two sets of pixels further comprises:

applying an optical flow constraint equation to the first set of pixels, the optical flow constraint equation comprising $x * u + y * v + t = 0$, wherein u and v are unknown components of the flow and x, y and t stand for differentiation.

7. The method of claim 1 wherein fusing the N motion compensated interpolated frames into a single, motion compensated interpolated frame further comprises:

for each pixel x, y in a final fused motion compensated interpolated frame:

applying a scalar median filter componentwise to a corresponding pixel in each of the N motion compensated interpolated frames 1-N to produce a resulting pixel x', y'; and

setting x, y to a corresponding pixel from a one of the N motion compensated interpolated frames that is color nearest to x', y'.

8. A computer readable medium containing a computer program product for robustly producing a motion compensated interpolation video frame, the computer program product comprising:

program code for constructing N motion compensated interpolated frames between two existing frames F1 and F2, wherein N comprises an integer with a value of at least 2; and

program code for fusing the N motion compensated interpolated frames into a single motion compensated interpolated frame.

9. The computer readable medium of claim 8 wherein the program code for constructing each of the N motion compensated interpolated frames between the two existing frames F1 and F2 further comprises:

program code for selecting a first set of pixels in F1, wherein the pixel sets selected for each of the N motion compensated frames varies;

program code for selecting a corresponding second set of pixels in F2, wherein the corresponding pixel sets selected for each of the N motion compensated frames varies;

program code for generating a first mesh for the first set of pixels and a second mesh for the second set of pixels;

program code for estimating a first flow of motion from the first set of pixels to the second set of pixels, and a second flow of motion from the second set of pixels to the first set of pixels;

program code for generating a first motion compensated mesh based on the first mesh and the first estimated flow of motion, and a second motion compensated mesh based on the second mesh and the second estimated flow of motion;

program code for computing a first warped image by warping F1 using the first mesh and the first motion compensated mesh, and a second warped image by warping F2 using the second mesh and the second motion compensated mesh; and

program code for linearly combing the first warped image and the second warped image.

10. The computer readable medium of claim 9 wherein the program code for selecting a set of pixels in a frame further comprises:

program code for classifying some pixels in the frame as having high spatial frequency contents and selecting the classified pixels, wherein the specific

classification criteria is different for each of the N motion compensated frames.

11. The computer readable medium of claim 9 wherein the program code for generating a mesh for a set of pixels further comprises:

program code for fitting a polygonal mesh to the set of pixels.

12. The computer readable medium of claim 11 wherein the program code for fitting a polygonal mesh to a set of pixels further comprises:

program code for applying a Delaunay triangulation to the set of pixels, using edges of the associated frame as imposed boundaries.

13. The computer readable medium of claim 9 wherein the program code for estimating a flow of motion between two sets of pixels further comprises:

program code for applying an optical flow constraint equation to the first set of pixels, the optical flow constraint equation comprising $x * u + y * v + t = 0$, wherein u and v are unknown components of the flow and x, y and t stand for differentiation.

14. The computer readable medium of claim 8 wherein the program code for fusing the N motion compensated interpolated frames into a single, motion compensated interpolated frame further comprises:

program code for, for each pixel x, y in a final fused motion compensated interpolated frame:

applying a scalar median filter componentwise to a corresponding pixel in each of the N motion compensated interpolated frames 1-N to produce a resulting pixel x', y'; and

setting x, y to a corresponding pixel from a one of the N motion compensated interpolated frames that is color nearest to x', y'.

15. A computer system for robustly producing a motion compensated interpolation video frame, the computer system comprising:

means for constructing N motion compensated interpolated frames between two existing frames F1 and F2, wherein N comprises an integer with a value of at least 2; and

means for fusing the N motion compensated interpolated frames into a single motion compensated interpolated frame.

16. The computer system of claim 15 wherein the means for constructing each of the N motion compensated interpolated frames between the two existing frames F1 and F2 further comprises:

means for selecting a first set of pixels in F1, wherein the pixel sets selected for each of the N motion compensated frames varies;

means for selecting a corresponding second set of pixels in F2, wherein the corresponding pixel sets selected for each of the N motion compensated frames varies;

means for generating a first mesh for the first set of pixels and a second mesh for the second set of pixels;

means for estimating a first flow of motion from the first set of pixels to the second set of pixels, and a second flow of motion from the second set of pixels to the first set of pixels;

means for generating a first motion compensated mesh based on the first mesh and the first estimated flow of motion, and a second motion compensated mesh based on the second mesh and the second estimated flow of motion;

means for computing a first warped image by warping F1 using the first mesh and the first motion compensated mesh, and a second warped image by warping F2 using the second mesh and the second motion compensated mesh; and

means for linearly combing the first warped image and the second warped image.

17. The computer system of claim 16 wherein the means for selecting a set of pixels in a frame further comprises:

means for classifying some pixels in the frame as having high spatial frequency contents and selecting the classified pixels, wherein the specific classification criteria is different for each of the N motion compensated frames.

18. The computer system of claim 16 wherein the means for generating a mesh for a set of pixels further comprises:

means for fitting a polygonal mesh to the set of pixels.

19. The computer system of claim 18 wherein the means for fitting a polygonal mesh to a set of pixels further comprises:

means for applying a Delaunay triangulation to the set of pixels, using edges of the associated frame as imposed boundaries.

20. The computer system of claim 16 wherein the means for estimating a flow of motion between two sets of pixels further comprises:

means for applying an optical flow constraint equation to the first set of pixels, the optical flow constraint equation comprising $x * u + y * v + t = 0$, wherein u and v are unknown components of the flow and x, y and t stand for differentiation.

21. The computer system of claim 15 wherein the means for fusing the N motion compensated interpolated frames into a single, motion compensated interpolated frame further comprises:

means for, for each pixel x, y in a final fused motion compensated interpolated frame:

applying a scalar median filter componentwise to a corresponding pixel in each of the N motion compensated interpolated frames 1-N to produce a resulting pixel x', y'; and

setting x, y to a corresponding pixel from a one of the N motion compensated interpolated frames that is color nearest to x', y'.

22. A computer system for robustly producing a motion compensated interpolation video frame, the computer system comprising:

a software portion configured to construct N motion compensated interpolated frames between two existing frames F1 and F2, wherein N comprises an integer with a value of at least 2; and

a software portion configured to fuse the N motion compensated interpolated frames into a single motion compensated interpolated frame.

23. The computer system of claim 22 wherein the software portion configured to construct each of the N motion compensated interpolated frames between the two existing frames F1 and F2 further comprises:

a software portion configured to select a first set of pixels in F1, wherein the pixel sets selected for each of the N motion compensated frames varies;

a software portion configured to select a corresponding second set of pixels in F2, wherein the corresponding pixel sets selected for each of the N motion compensated frames varies;

a software portion configured to generate a first mesh for the first set of pixels and a second mesh for the second set of pixels;

a software portion configured to estimate a first flow of motion from the first set of pixels to the second set of pixels, and a second flow of motion from the second set of pixels to the first set of pixels;

a software portion configured to generate a first motion compensated mesh based on the first mesh and the first estimated flow of motion, and a second motion compensated mesh based on the second mesh and the second estimated flow of motion;

a software portion configured to compute a first warped image by warping F1 using the first mesh and the first motion compensated mesh, and a second warped image by warping F2 using the second mesh and the second motion compensated mesh; and

a software portion configured to linearly combine the first warped image and the second warped image.

24. The computer system of claim 23 wherein the software portion configured to select a set of pixels in a frame further comprises:

a software portion configured to classify some pixels in the frame as having high spatial frequency contents and selecting the classified pixels, wherein the specific classification criteria is different for each of the N motion compensated frames.

25. The computer system of claim 23 wherein the software portion configured to generate a mesh for a set of pixels further comprises:

a software portion configured to fit a polygonal mesh to the set of pixels.

26. The computer system of claim 25 wherein the software portion configured to fit a polygonal mesh to a set of pixels further comprises:

a software portion configured to apply a Delaunay triangulation to the set of pixels, using edges of the associated frame as imposed boundaries.

27. The computer system of claim 23 wherein the software portion configured to estimate a flow of motion between two sets of pixels further comprises:

a software portion configured to apply an optical flow constraint equation to the first set of pixels, the optical flow constraint equation comprising $x * u + y * v + t = 0$, wherein u and v are unknown components of the flow and x, y and t stand for differentiation.

28. The computer system of claim 22 wherein the software portion configured to fuse the N motion compensated interpolated frames into a single, motion compensated interpolated frame further comprises:

a software portion configured to, for each pixel x, y in a final fused motion compensated interpolated frame:

apply a scalar median filter componentwise to a corresponding pixel in each of the N motion compensated interpolated frames 1-N to produce a resulting pixel x', y'; and

set x, y to a corresponding pixel from a one of the N motion compensated interpolated frames that is color nearest to x', y'.